

# EESEAL® ADDS EMI AND ESD PROTECTION TO YOUR CONNECTOR IN SECONDS



# Quell's Mission

## Supplying EESeals® since 1995

To be instrumental to our customers' success by delivering top quality EESeal® connector inserts for high value electronics with EMI and/or transient protection issues. To provide fast and effective solutions that supply high value to our customers.

## What We Can Offer You

For over 20 years, Quell Corporation has been committed to providing top-quality EMI/RFI filters for a wide variety of connectors. We take pride in our patented silicone rubber electronics packaging technology, and the role EESeal® has played in solving EMI problems for our great customers worldwide.

Quell Corporation designs and manufactures EMI/RFI and transient protection solutions specific to our customers' applications and products. At our headquarters in Albuquerque, NM, Quell has the engineering talent and manufacturing expertise to deliver customized EESeals® quickly and cost-effectively.

Many of our customers have just failed EMI testing and are under tremendous pressure to find a solution NOW. We can help you get back on schedule with a permanent solution to your EMI compliance problem without:

- The cost and schedule delay of a board spin
- The cost and schedule delay of procuring customized filtered connectors
- The weight penalty of adding shielding



**FREE CUSTOM SAMPLE  
IN 24 - 48 HOURS**

At Quell, we routinely design and build custom prototypes the same day they are requested and ship them overnight – for **FREE!** That's right – quick response, zero cost, and you can prove your EESeal® solution the very next day.

# Applications

EESeals® routinely fix EMI/RFI, EMP, lightning and ESD compliance problems in a variety of applications including Military, Aerospace, Medical, Transportation, Industrial and more.

EESeals® help you meet a variety of EMC standards, including but not limited to:

**MIL-STD-461 and DO-160**

- Conducted Susceptibility (CS101, CS114, CS115, CS116)
- Conducted Emissions (CE101, CE102)
- Radiated Emissions (RE101, RE102, RE103)
- Radiated Susceptibility (RS103, RS105)



MILITARY



AEROSPACE



SPACE



MEDICAL



TRANSPORTATION



TELECOMMUNICATION

Proven Production Solution with  
**OVER 2.5 MILLION SOLD** Into Hi-Rel Applications

# How It Works

EESeal® and EESeal+® EMI Filter inserts (and Transient Suppressors) for connectors are an easy retrofit that allows you to add custom circuitry to your standard connector in seconds, including EMI filtering, ESD/transient protection, resistors, shorts, etc.

Our EESeals® are made of resilient silicone rubber and are quick and easy to install, even in the field. The innovative design ensures survival under extreme environmental conditions. By using just your fingertip, you can easily retrofit and install an EESeal® insert in your connector in only seconds. EESeals® offer you the flexibility to develop an application-specific circuit design. A wide variety of SMD components, typically 0402 or 0603 devices, can be selected to meet your application's exact requirements.



SCAN HERE FOR MORE INFO

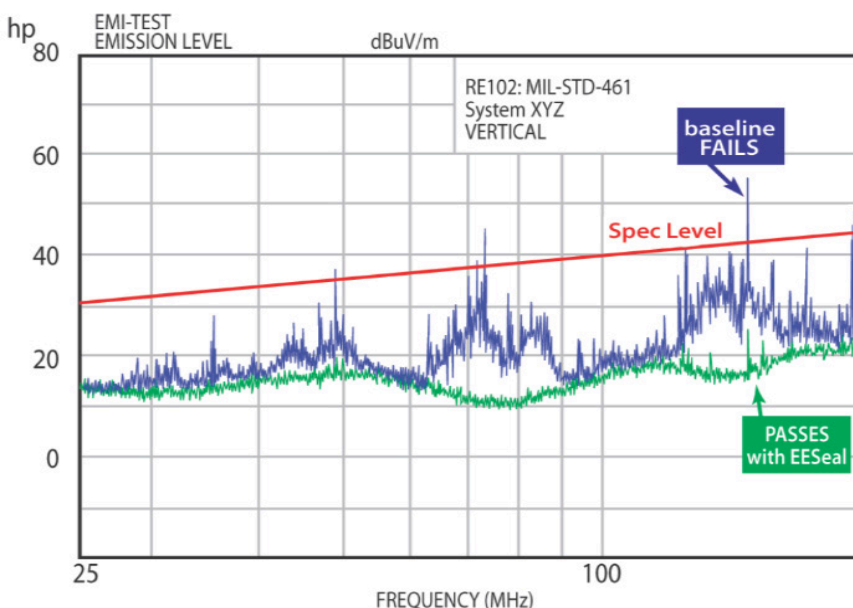
Your EESeal® can have components (capacitors, resistors, MOV's, TVS's and more) connected Pin-to-Pin, Pin-to-Shell, shorts, opens, etc. Each pin can have a different individual treatment.

## Make Your Standard Connector an EMI FILTERED CONNECTOR, in Seconds.

# Fast, Easy, Effective

EESeals® are easy to install. Place the EESeal® over the pins of the connector and use the mating connector as your insertion tool. Installation can typically be done in just seconds!

Once the EESeal® is installed that is when the fun begins. Comparing the results of your standard connector with an EESeal® to your base line can show instant success. EMC compliance from 100kHz up to 100GHz can be achieved. Custom samples can be shipped in 24-48 hours.



# Silicone Rubber Packaging Technology

Virtually “invisible” once installed, EESeal® inserts for connectors are made of the same super-resilient material used in the interfacial seals of high-reliability, ruggedized military connectors.

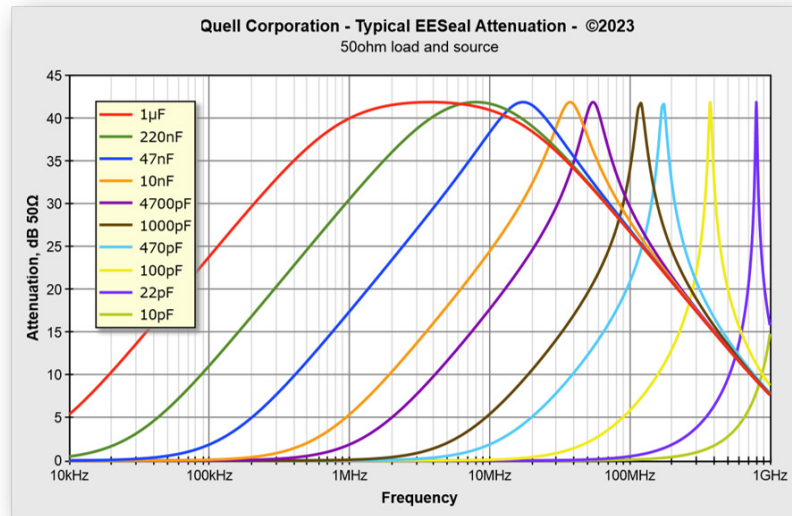
The secret behind EESeal® is Quell’s innovative electronic packaging technology – our patented Elastomeric Body and Adaptive Interconnect System which suspends, isolates, and protects discrete electrical components.

EESeals® adapt to the mating forces of the connector and morph into a shape that mimics the cork and bottle structure of the connector interface and interfacial seal.

## Design Flexibility

EESeals® offer you the flexibility to have your insert, your way. A wide variety of SMD components, typically 0402 or 0603 devices, can be selected to meet your application’s exact requirements.

Your EESeal® can have components (capacitors, resistors, MOV’s, TVS’s and more) connected Pin-to-Pin, Pin-to-Shell, shorts, opens, etc., and every pin can have a different individual treatment.



## EESeal

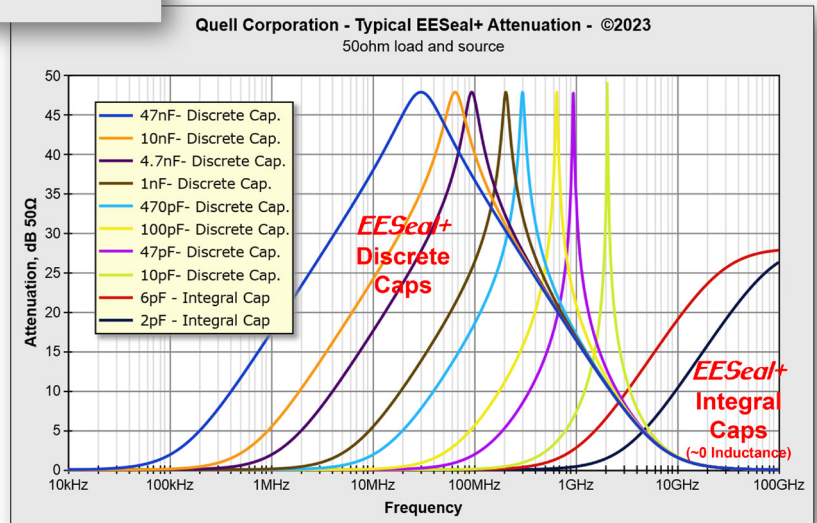
Each EESeal is totally customizable, and each pin can be treated uniquely based on the capacitance or voltage needs. Depending on the connector density, your circuit may have multiple devices in series and/or parallel.

The EESeal mitigates noise from 10KHz up to 3GHz.

## EESeal+

The conductive silicone ground plane provides low inductance and low contact resistance. Discrete and integral capacitors can be used inside the EESeal+ allowing for a wide range of noise mitigation. The integral capacitors are made from the EESeal+ proprietary conductive silicone and provide up to 6pF of capacitance with almost zero inductance.

EESeal+ can mitigate noise up to 100GHz.



# EESeal® - New patented conductive silicone elastomer construction DOES NOT CORRUPT EXISTING SEALS & adapts to real-world abuse.

## EESeal® creates & exploits silicone body compression

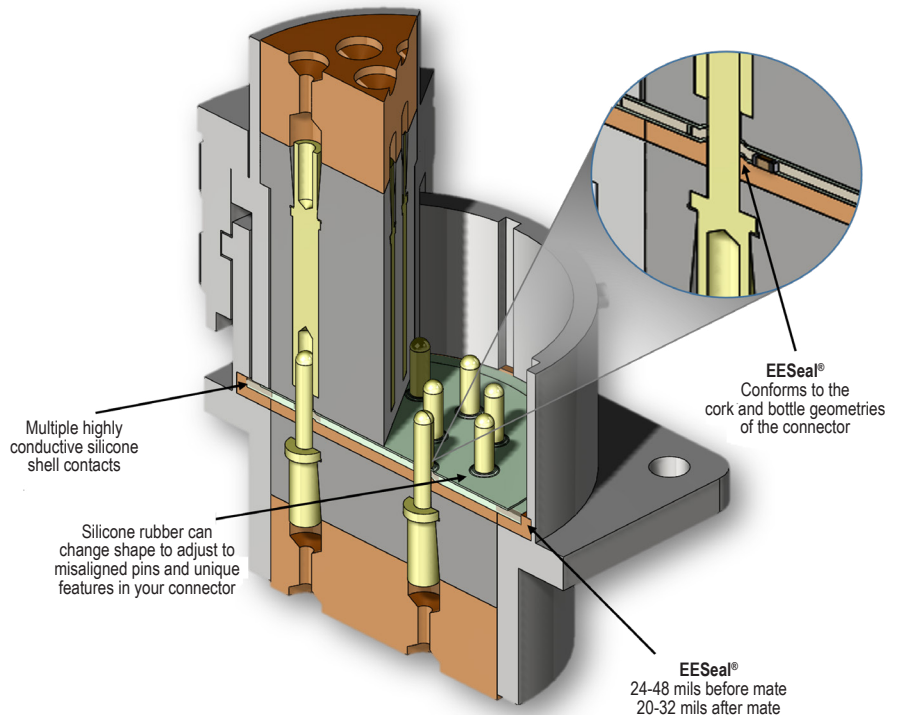
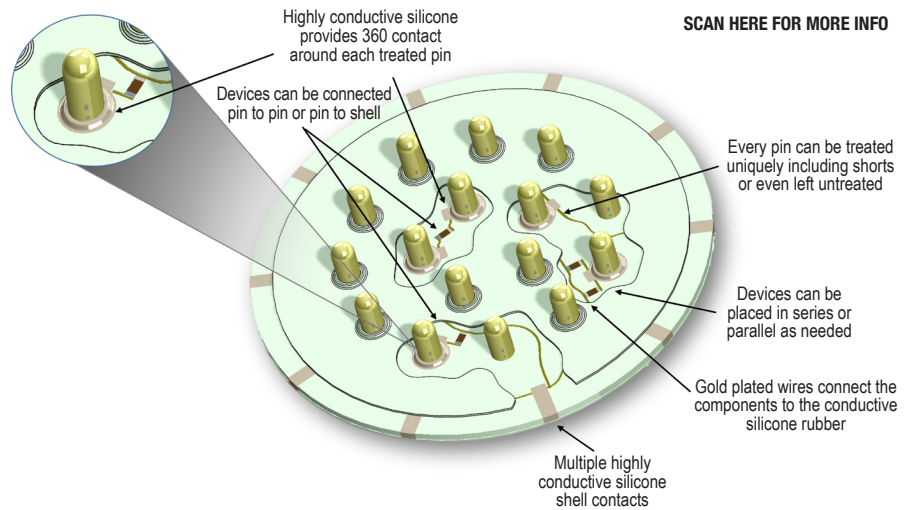
The EESeal® compression is created and focused by undersizing the pinholes, oversizing the outer diameter, and using the connector mating forces.

The advantage of using silicone rubber in all EESeals is that it allows them to change their shape, adapt to misaligned pins and maintain the interfacial seal. The conductive silicone pin and edge contacts establish reliable and durable electrical connections between pins and/or connector shell. The compression of the silicone rubber in concert with the connector are used to maintain the environmental seal while mechanically isolating and protecting all the internal components.

- 360° conductive silicone contact around each pin
- Multiple conductive silicone peripheral shell contacts
- Environmental seal maintained for the host connector
- Individual components and interconnections move as the body changes shape while maintaining electrical and mechanical integrity
- Body acts as conformal coat and electrical isolation for suspended components

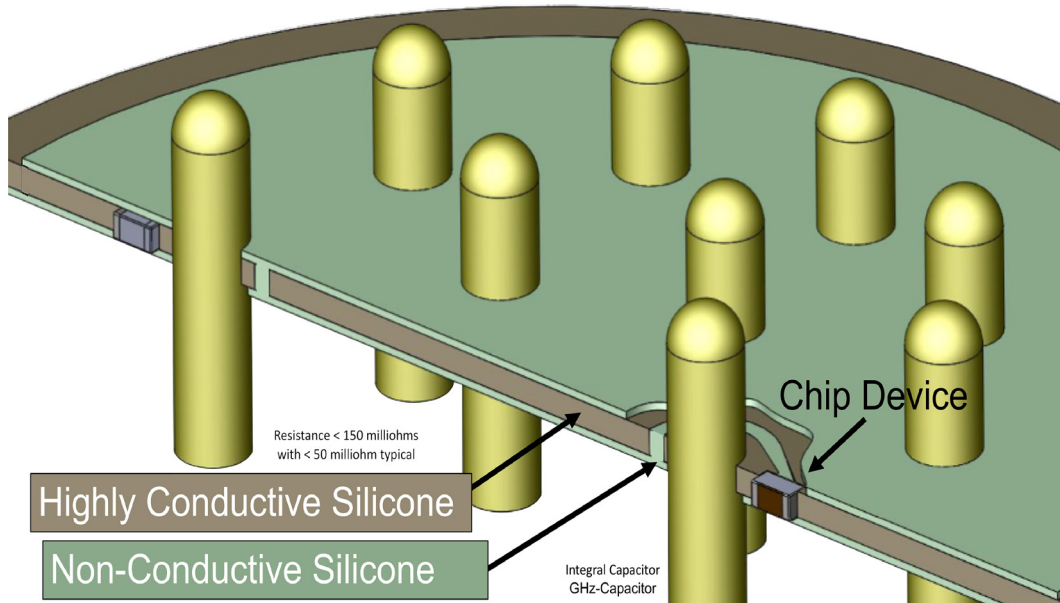


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Full test reports are available to download from our website at <http://eeseal.com/performance/>

# EESeal+® Enhanced filtering for those Difficult High Frequency Mitigation Requirements or Greater Attenuation Needs: 100MHz - 50GHz+



## EESeal+®

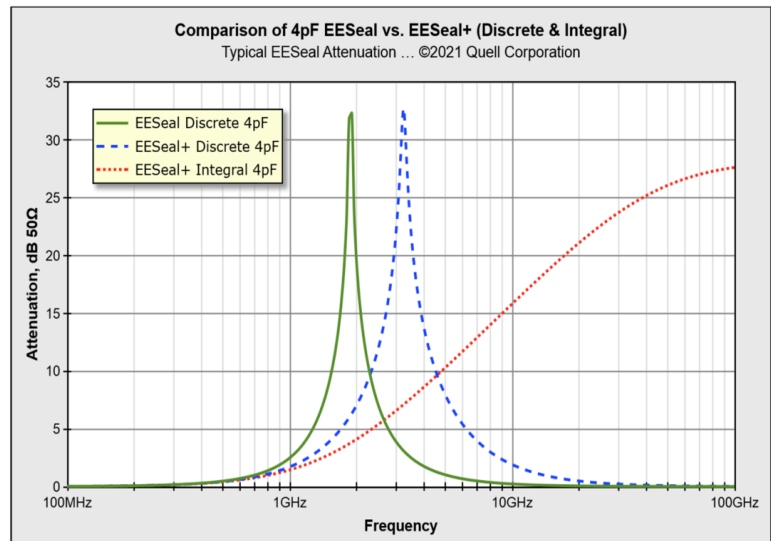
The EESeal+® utilizes conductive silicone rubber to provide an extremely low inductance ground plane. Integral capacitors are created in the EESeal+ by replacing our standard non-conductive silicone with an exceedingly high dielectric constant silicone to create a small (2-6pF) capacitor with virtually no inductance. They can be standalone or combined with a discrete device to attack both lower frequencies and provide filtering up to 100GHz.

Advantages of the product include:

- Lowers contact resistance
- Lowers inductance
- Up to 45-50dB attenuation – Peak Frequency
- Mitigation up to 100GHz
- Nominal resistance < 150 milliohms with < 50 milliohm typical.

The EESeal+® product can include designs that incorporate:

- Discrete capacitors
- Integral capacitors
- Discrete & integral capacitors

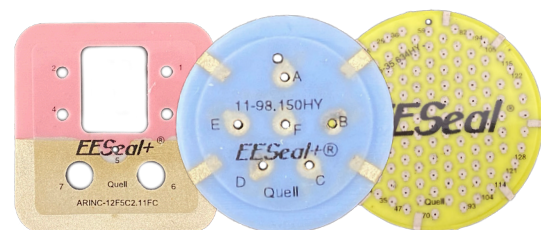


## EESeal® & EESeal+® Withstand Harsh Environments

EESeal® and EESeal+® are designed to withstand extremely harsh conditions. They meet or exceed the environmental requirements of most military and commercial connector specifications (e.g., D38999). These environmental and mechanical tests were conducted by independent laboratories with EESeals® mounted inside D38999 connectors showing that severe environments do not affect the integrity of EESeal® FilterSeals or the host connector. Full test reports are available upon request or can be downloaded from our website.

Test	EESeal+® Requirement	EESeal+®/Exceptions
Temperature Cycling	EIA-364-32	-55°C to 125°C, 5 cycles
Altitude Immersion	EIA-364-03	Mated connectors immersed in salt solution, 30 min. @ 75,000 ft, then 30 min. @ ambient pressure, 3 cycles
Salt Spray - Dynamic Test.	EIA/ECA-364-26	95°F for 452hr with connectors mated followed by 48hr with connectors unmated
Altitude-Low Temperature	EIA-364-105	-55°C, 100,000 ft
Durability	MIL-DTL-38999M Paragraph 4.5.8	500 mate/demate cycles
Vibration	EIA-364-28	<b>Sine:</b> 254mm/sec from 10-50Hz, 1.5mm double amplitude from 50-140Hz, 60G from 140-2000Hz 4 hours/axis @ ambient temperature, 4 hours/axis @ -55°C, 4 hours/axis @ 125°C, total 3 axes <b>Random:</b> Test Condition V, 2.4Hz @ 0.1G <sup>2</sup> /Hz to 100Hz @ 5G <sup>2</sup> /Hz to 300Hz @ 5G <sup>2</sup> /Hz to 2000Hz @ 0.1G <sup>2</sup> /Hz, 8 hours in longitudinal direction, 8 hours in a perpendicular direction, ambient temperature
Shock - Standard Shock	EIA-364-27	Half sine wave of 300 G ± 15 percent magnitude with a duration of 3 ± 1 milliseconds
Humidity	EIA-364-31	Dynamic: 90-98% relative humidity, 25C to 65C, 10 cycles of 24hr each; 90-98% RH, -10C for 3hr during 5 of the first 9 cycles
Fluid Immersion	EIA-364-10	Fluids A-I, K with connectors mated
Fungus	MIL-STD-810 Method 508.6.	28 days
Thermal Vacuum Outgassing	ASTM-E-595-07	TML <1%; CVCM <0.1%, Post bake required, 24 hours @300F
Flammability	FAR 25.853	

\*Nearly every EESeal® insert is custom designed for your specific application and connector. Whenever a particular environmental feature is critical to your application, we recommend that you test the specific EESeal and connector combination to verify its suitability for your use.



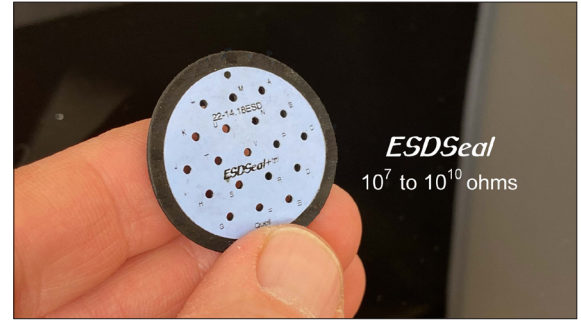


# New Insert Products & Other Specialty Products

## ESDSeal™

The ESDSeal™ product is designed for ESD protection for cable discharge events (CDE). The substrate is a highly resistive material with resistance ranging from  $10^7$  to  $10^{10}$  ohms.

Discrete components such as resistors can be easily damaged in an electrostatic discharge (ESD) or transient event. These ESD transients can couple to neighboring circuits and damage electronic components. By installing the ESDSeal™ into an existing, or new electrical connector and/or cable harness, electrostatic buildup can be prevented or “bleed” off.



<https://eeseal.com/instructional-videos/>

The ESDSeal™ technology is made from a proprietary silicone elastomer, which is designed to not corrupt the existing interfacial seal.

## Filter Connector Solutions

Quell's wide range of noise mitigation products includes EMC and transient protection mounted in the rear of the connector. Our behind-panel solutions use standard off-the-shelf PCB mount connector components to filter sockets and/or add additional circuit protection.

Now Quell's wide range of noise mitigation products includes EMC and transient protection mounted in the rear of the connector. These behind-panel solutions use standard off-the-shelf PCB mount connector components to filter sockets and pins.

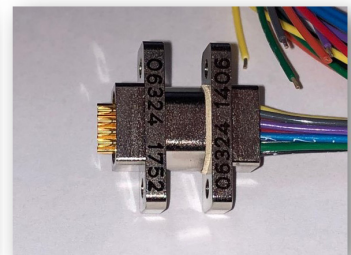
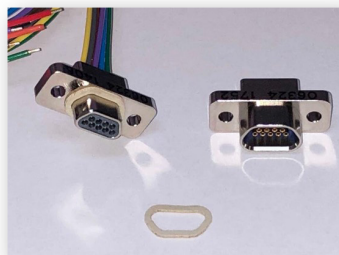


Using the same innovative packaging technology as the EESeal® and EESeal+® allows for considerable flexibility which enables each pin to be treated uniquely.



## Gaskets

Sometimes simply grounding pins or shields within a connector can solve an EMI issue. To answer this need, Quell has developed conductive gaskets which can be retro-fitted into a connector, providing grounding for the pins you specify. Our proprietary highly conductive silicone has typically less than 50 milliohms. If your need is for a non-conductive gasket for enhanced environmental sealing, Quell can help solve these issues as well.



# Why EESeal® and EESeal+® Makes Sense for You

## BENEFITS of EESeal® Filter Seals

EESeal® can quickly and easily RETROFIT any connector with EMI & transient protection. Plus:

- Easy to install & remove in field by non-expert personnel with no special tools (tools are available to facilitate installation for some connectors)
- Virtually “invisible” once installed – they look like a normal part of a connector
- Maintains environmental seal of host connector
- Adapts to real world variations & stress commonly associated with connectors and connector pins (bent pins, severe shock & vibration, rough handling, etc.)
- Rugged design proven via various MIL-STD & FAA/DO-160C environmental stress testing
- Extremely lightweight – less than 1 gram
- Filter can be designed/modified very late in the design process

## ADVANTAGES Over Existing EMI Filters

No circuit-board, substrate or brittle materials of any kind.

- **Made from silicone elastomer material**, similar to the interfacial seal in most circular connectors, it does not create air pockets or defeat the existing environmental seal.
- **Components and wiring are fully embedded in protective silicone material** – components cannot “pop off” and won’t be damaged/cracked during installation or use.
- **All external and internal wiring is gold plated** (50-70µin Au over Ni flash per MIL-G-45204); withstands severe temperature ranges and exposure to many deteriorating influences such as ozone, chemicals, aging and UV.
- **No “brittle” spring metal contacts** (e.g., BeCu), so EESeal® contacts can accommodate severe misalignment and mismatch without degradation and will not be “sprung” by over stress during installation or use.



**Install an EESeal® FAST at the Test Site - Test It, Remove It, Re-Test to Confirm Baseline and Reinstall!**

# EMC Compliance/Transient Protection: Next Steps

## Compliance

Quell Corporation engineers are ready to work with you to solve your EMI and transient protection problems.



## Contact us today by phone or email — it's easy and you won't be sorry.

First, we will determine which EESeal® insert design is right for you, and then we will gladly provide you with a FREE sample. We can usually design, build and ship custom samples within a day or two of your initial request. Our engineers will optimize your EESeal® filter design to maximize performance. We manufacture EESeal® inserts for a wide range of military-spec, commercial and custom connectors, including MIL-C-38999, MIL-C-26482, MIL-C-5015, MIL-C-83723, ARINC, Lemo, MDM, Sub miniatures and more.



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## Customer Testimonial

*"Wow! We got improvement in our problem areas, much better than I expected. As close to a silver bullet as I've ever seen! Excellent product from a company with excellent customer service."*

— K.H.



5639 Jefferson NE Albuquerque, NM 87109 USA

## How do you know if EESeals® are right for you?

Call right now and we will send you a **FREE EESeal® EMI solution package!** Once you receive the insert, you will be pleased at just how easy EESeals® tackle EMI and transient problems in your high-reliability electronics.

**The answer can be in your hands in as little as 24 to 48 hours!**  
**Sales Engineers are standing by to take your call!**

### All we need:

- Your connector part number
- A description of your EMI or transient issue
- Your max AC/DC voltages
- Your max signal frequencies and data rates
- Any transient or lightning specifications
- An address for shipping



***FREE Custom Samples Within 24 hours!***

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